

# Surgical Treatment of Myasthenia Gravis

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## SUMMARY

*On the basis of statistics, total thymectomy should be considered for the treatment of myasthenia gravis if the disease is severe and response to well regulated medical management is unsatisfactory. That improvement follows the operation in many cases, particularly if symptoms are of recent development, is indicated by reports in the literature. Of two patients operated upon by the author, one whose symptoms were of short duration was benefited objectively and subjectively; the other, in whom symptoms had existed seven years, said she felt better but there was no objective evidence of improvement. Patients should be told beforehand of the operative risks involved and the uncertainty of prognosis following the procedure.*

TOTAL thymectomy has been performed many times during the last seven years in severe cases of myasthenia gravis which have been resistant to the best of medical management. It is for the few seriously afflicted patients whose response to prostigmine and other medical therapy is poor that operation is to be considered. In a series of 20 patients upon whom complete thymectomy was performed by Blalock<sup>2</sup> and in another series of 60 operated upon by Keynes<sup>4</sup> the mortality rate was approximately 20 per cent and the rate of cure approximately 50 per cent. These facts were explained to the author's patients, and two of them who were not doing well on medical management elected operation. These two cases will be reported in this presentation, with special reference to the surgical management of this condition.

## DIAGNOSIS AND MEDICAL MANAGEMENT

Recognition of myasthenia gravis depends upon the symptoms and signs associated with weakness of the muscles of the eye, larynx, pharynx, jaws, face and extremities. These may begin insidiously or abruptly and at any age. One of our patients was 21, the other 19. In one the symptoms had been present for seven years, in the other for four months. Fatigue takes place rapidly in the muscles involved. It is lessened by rest and by prostigmine. This drug introduced by Remen<sup>5</sup> and popularized by Walker<sup>8</sup> is so specific in myasthenia gravis that the response

to its administration is diagnostic of the condition (Viets<sup>7</sup>).

The optimum dosage varies. In one of our cases it was 120 mg. of prostigmine bromide daily and in the other 250 mg. Other drugs such as ephedrine sulfate, potassium chloride and guanidine hydrochloride have not been used. As the proper medical management is in the province of the internist and general practitioner it will be discussed herein no further.

## INDICATIONS FOR OPERATION

The development of total thymectomy for myasthenia gravis began with Blalock<sup>3</sup> about seven years ago. He recognized the frequent occurrence of thymic tumors with myasthenia gravis and he furthermore reasoned that, even when no tumor existed, removal of the thymus might be effective. The validity of this assumption has been borne out in about 50 per cent of the several series aggregating 80 cases (Table 1) of total thymectomy. In nine of these cases the patient had a thymic tumor but the incidence of cure in them was no greater than in those cases in which no tumor existed. (In neither of the author's two cases was there evidence of thymoma either by x-ray previous to operation or by a pathological examination of the removed gland.) The mortality rate in the total series was approximately 20 per cent. In this connection, however, it must be recognized that the operative group included the most severely afflicted patients. Contrasting this operative group with a series of 175 patients reported by Viets which were on purely medical management, there were 14 per cent of apparently permanent cures and a mortality rate of 20 per cent over a ten-year period.

TABLE 1.—Results of Thymectomy

	Keynes	Blalock	Viets	Total
Well or greatly improved.....	29	8	4	41
Ill or slightly improved.....	12	8	4	24
Operative mortality .....				15

On the basis of these facts it seems reasonable to conclude that operation should not be considered except for those patients with severe myasthenia gravis who do not respond satisfactorily to a well regulated regime of medical management. Furthermore it seems wise to explain the risks and the possible benefits and allow the patient to decide whether or not he desires operation.

Duration of the myasthenic symptoms may be of some importance in the prognosis following operation. In the series of 80 cases only one of the

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patients obtaining good results had had symptoms longer than five years. One of the author's patients with symptoms existing for seven years did not show objective improvement following thymectomy. X-ray therapy has often been proposed as an alternative to the more radical surgical attack. However, almost all authorities are agreed that it is ineffective and should not be utilized.<sup>7</sup>

#### PREOPERATIVE TREATMENT

Preparation of the patient for operation includes special attention to the respiratory tract. Any history of a cold in the last few weeks is an indication for postponement. Penicillin should be given prophylactically for a few days before and continued through several days after operation. Face masks should be used by all those attending the patient. Prostigmine should be given in dosages producing maximum therapeutic effect. This means anywhere from a few tablets of 15 mg. of prostigmine bromide to 30 such tablets spaced throughout the 24 hours. In addition, 1.5 mg. of prostigmine methyl sulfate is given hypodermically just before and during and after operation until oral administration can be

resumed. Determination of the patient's blood group before the operation and administration of blood during the procedure should be a part of the routine. Morphine should be limited to small doses. Atropine must be used more frequently than in other operations, both because of the heightened secretions and because it counteracts the stimulating effect of prostigmine on smooth muscles.

#### SURGICAL TECHNIQUE

The operation, the technique of which was developed by Blalock and Keynes, is performed under intubation or under pressure anesthetic. Ether is safe and satisfactory. Only a very little, 1 to 2 ounces, was necessary in our two operations. A low thyroid incision (Figure 1) was made. This was joined in the center by a longitudinal incision over the sternum extending down to the fourth interspace. The neck dissection was then developed so that the lower poles of the thyroid were exposed. Just below these the upper lobe of the thymus was visible. (In one of our cases the right lobe of the thymus extended up into the neck well beyond the level of the thyroid cartilage. Ordinarily it ends at

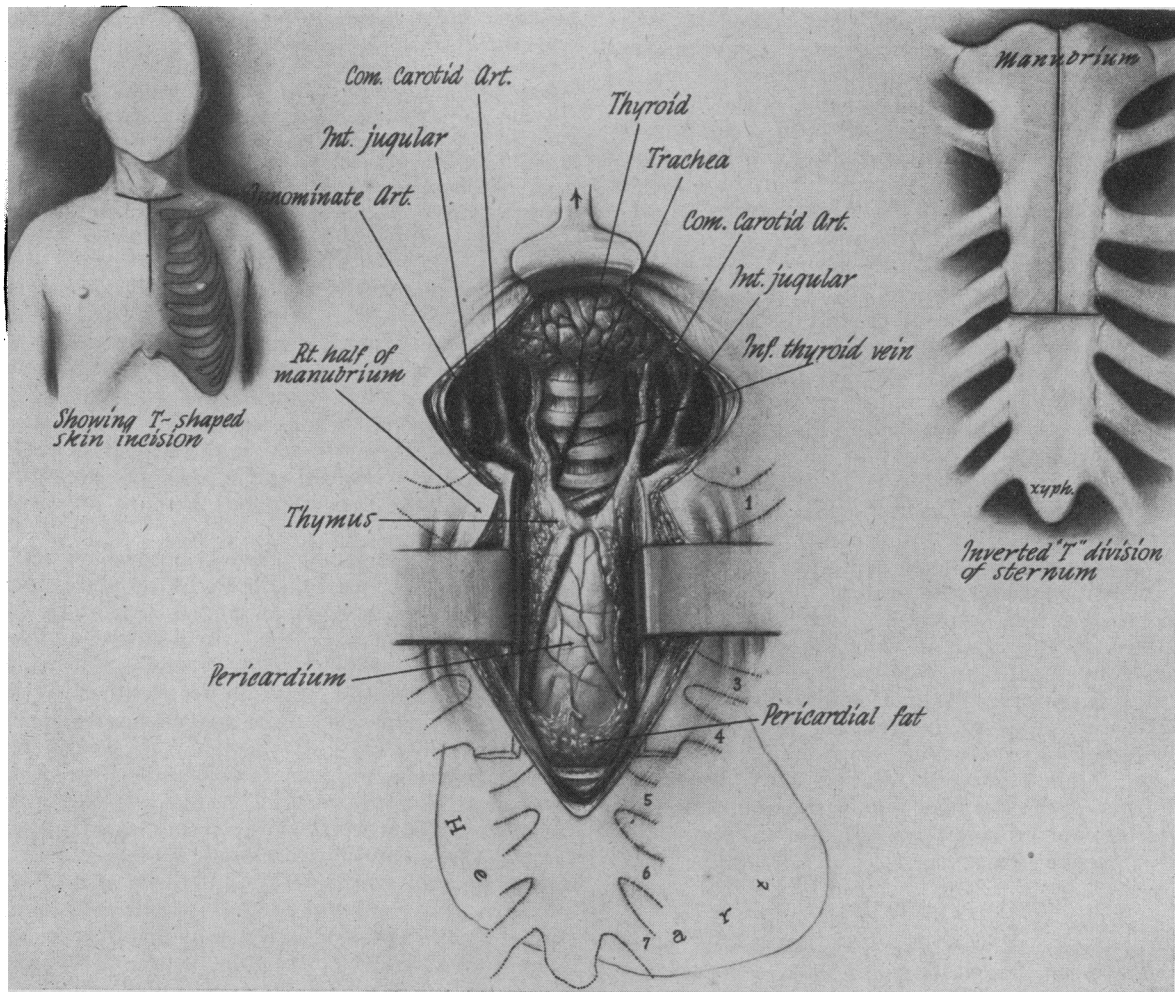


Figure 1

the thyroid.) The neck dissection completed, a finger was inserted as far as possible beneath the jugular notch on the posterior surface of the sternum separating the pleura in the midline. The sternum was then split for a short distance. (This may be done with a Schumacher rib cutter or with a Lebsche sternum splitter.) The edges of the sternum were then separated with retractors and further finger dissection of the pleura from the posterior surface of the sternum was easily accomplished. The process was continued to the fourth interspace at which level two outward cuts were made in the two longitudinal halves of the sternum and these were separated. This exposed the thymus gland completely. (It can usually be identified by following the upper exposed lobes downward and separating the pleura from its anterior surface.) The lobes were separated from the fatty tissue covering the pericardium. All the small arteries to the thymus gland were carefully ligated as a precaution against postoperative mediastinal hemorrhage, one of the most difficult complications to control. The main tributary vein from the thymus, which joins the left innominate, was carefully isolated and tied. After the completion of the removal of the gland, several strips of Gelfoam were applied to areas where there was a general ooze. Another method that has been used to control the bleeding from the raw surfaces of the mediastinum is the insertion of a ureteral catheter and frequent aspiration, as suggestion by Ralph Adams,<sup>8</sup> but this was not found necessary. We used a Penrose drain brought out through the incision in the neck, feeling that this was a worthwhile safety measure.

In closing the wound, the halves of the sternum were brought together with two or three heavy silk sutures passed completely around the bone and tied on the anterior surface. Fascia overlying the sternum was then closed with interrupted fine silk. Time required for the entire procedure was from one and one-half to two hours. Both patients stood the procedure well.

Immediately following, the trachea was thoroughly aspirated. The patient in each case was given 1.5 mg. of methyl prostigmine hypodermically. This was continued every two to three hours until he could take the prostigmine by mouth. An oxygen tent was provided. Penicillin was administered in full dosages. The patient was allowed fluids by mouth as soon as they were tolerated. Using a portable machine, roentgenograms of the chest were taken on the first and second days postoperatively to determine the size of the mediastinum. Ambulation was allowed early despite the division of the sternum. The oral administration of prostigmine bromide was adjusted to accord with the patient's needs.

#### CASE REPORT

The patient, 19 years of age, was admitted to the Los Angeles County Hospital because of weakness of the extremities. Four months previously profound weakness of the muscles of the arms had developed following a

respiratory infection so that the patient had to remain in bed for several weeks. Two months before hospitalization the condition was diagnosed as myasthenia gravis. By this time the patient was able to be up only a little while each day. In addition to the weakness of the extremities there was diplopia, some difficulty in swallowing and weakness of the facial muscles. All symptoms and signs regressed with the giving of prostigmine bromide (15 mg. divided into ten doses daily) but even when the dose was doubled the patient was still unable to work and had to be in bed a good part of each day. After preliminary rest and regulation of the prostigmine therapy in the hospital, the patient was prepared for thymectomy, which he elected after the risk of the procedure and the prognosis after operation were explained. A preliminary tonsillectomy was performed because of badly infected tonsils. Three weeks later a thymectomy was done, using the previously described technique.

The thymus gland measured about 20 cm. in length and weighed 28 gm. Neither the gross appearance nor microscopic appearance was remarkable.

Postoperatively 1.5 mg. of prostigmine methyl sulfate was given hypodermically about every hour for the first 48 hours. Gradually the frequency of administration was reduced and the patient was placed on the previous preoperative dose of prostigmine bromide by mouth. Penicillin was administered in large dosages. On the fifth day postoperatively the patient experienced considerable difficulty in breathing and the wound was opened but no clot or hematoma found. Gradually his condition improved. Except for a low-grade infection following the secondary surgical procedure recovery was uneventful. At the time of discharge, prostigmine, to be taken in doses of 1.5 mg. six times daily, was prescribed. When examined five months later, he was feeling better than at any time since the onset of the disease, was back at work and was taking only three doses of prostigmine daily on occasion. In weight and strength he had returned to normal.

#### RESULTS

It is not possible to draw any conclusions from experience in two cases. One patient had had symptoms for seven years. There has been no objective improvement since the operation, but subjectively she seems to have been benefited, as she persistently states that she feels stronger. Further observation will be necessary before any final statement is made about this case. However, at the present writing it is not felt that the operation has been of any real benefit.

The second patient had had symptoms for only four months. He was unable to be up more than part of the day in spite of maximum dosages of prostigmine. Following total thymectomy he has been quite active all day while receiving only one-half the preoperative dose of prostigmine. It is believed that in this case there was real improvement following operation. In view of the results reported in the literature and actual experience with two cases here recorded, it seems reasonable to conclude that it is worthwhile offering total thymectomy to those patients with severe myasthenia who do not respond satisfactorily to the best of medical management. Furthermore the operations demonstrated to the author's satisfaction that the procedure of total thymectomy can be completed without mishap if adequate amounts of prostigmine are given before, during and after operation, if light

pressure anesthesia is given, and if the technique developed by Blalock and Keynes and here presented is carefully followed.

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